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Evaluating Water Quality Criteria for Designated Uses in Ephemeral and Effluent-dependent Watercourses of the Arid West

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The federal Clean Water Act dictates that state and tribal water quality standards are to be developed for 307(c) priority toxic pollutants if data indicate a reasonable likelihood that the pollutant could interfere with attainment of designated uses. These standards in turn are usually based on federal Ambient Water Quality Criteria (AWQC) as the basis for the numeric standards. While AWQC are intended to be protective of aquatic life and their uses nation-wide, they may not always be appropriate for the unique species assemblages and characteristics of ephemeral and effluent-dominated watercourses in the arid western U.S. Therefore, as part of the Arid West Water Quality Research Project, we evaluated four existing and proposed AWQC (copper, selenium, diazinon, and copper) for their relevance to the attainment of designated uses in these unique aquatic ecosystems.

Our results suggest that, while existing AWQC magnitude, frequency, and duration (i.e., averaging period) values for these criteria seem to be generally appropriate for use in effluent-dominated systems in the arid west. However, the unique nature of these systems may call into question the straightforward application of AWQC to effluent-dominated systems. Important factors in this regard may include whether effluent flows sufficiently stabilize natural variability in stream water flows in arid lands, and whether flow-related changes in water quality characteristics might significantly influence pollutant bioavailability. In contrast to effluent-dependent systems, changes in AWQC might be even more appropriate to set appropriate water quality standards for naturally ephemeral streams. Such changes could include the use of EPA's Recalculation Procedure to modify AWQC to reflect the limited or unique fish assemblages in these systems. Furthermore, it might be possible that the default frequency of allowed excursions could be reduced (i.e., to less than once every three years) owing to the relatively rapid recovery characteristics of aquatic communities in these ecosystems. Additional study of arid west ephemeral systems is warranted, however, to verify these conclusions.